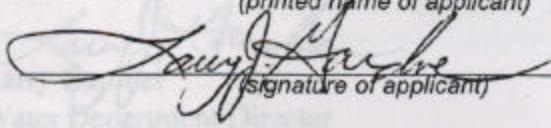


A. Cover Sheet (Attach to front of proposal.)

1. Specify: ☐ agricultural project or ☐ individual application or
☒ urban project ☐ joint application
2. Proposal title—concise but descriptive: Graywater Pilot Program and Research Study
3. Principal applicant—organization or affiliation: City of San Diego Water Department
4. Contact—name, title: Larry Gardner, Water Department Director
5. Mailing address: 202 C Street, MS-9B, San Diego, CA 92101
6. Telephone: (619) 236-6750
7. Fax: (619) 236-6751
8. E-mail: LJG@SDCITY.SANNET.GOV
9. Funds requested—dollar amount: \$ 400,000
10. Applicant cost share funds pledged—dollar amount: \$ 400,000
11. Duration—(month/year to month/year): 7/1/2001 to 6/30/2006
12. State Assembly and Senate districts and Congressional district(s) where the project is to be conducted:
Assembly: 75, 76, 78, 79 Senate: 37, 39, 40
Congressional: 49, 50, 51, 52
13. Location and geographic boundaries of the project: City of San Diego
14. Name and signature of official representing applicant. By signing below, the applicant declares the following:
☒ the truthfulness of all representations in the proposal;
☒ the individual signing the form is authorized to submit the application on behalf of the applicant;
☒ the applicant will comply with contract terms and conditions identified in Section 11 of this PSP.
- LARRY GARDNER
(printed name of applicant)
- 
(signature of applicant)
- 2/5/2001
(date)

B. Scope of Work

Relevance and Importance

1. Abstract (Executive Summary)

This is a project to determine the water conservation values of residential graywater recycling irrigation systems in Southern California under normal use scenarios during all seasons. It will provide partial funding along with other agency funding to purchase, install, and monitor graywater irrigation systems in various developments encompassing the full socioeconomic range of homeowners throughout a diverse geographical area.

The proposed Graywater Incentive Pilot Program and Research Study will initiate a long-term research study of the multiple effects of graywater irrigation systems installed by individual homeowners within the City of San Diego. Graywater is untreated household waste water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It shall not include waste water from kitchen sinks or dishwashers. (UPC Section G-2). A financial incentive of \$1,000 will be provided to up to 300 homeowners (estimated cost \$300,000), after they have installed a complete graywater irrigation system approved by the County of San Diego.

The Research Study (Study) (estimated cost \$500,000) will be conducted by an independent research institution (i.e., American Water Works Associate Research Foundation or University of California Cooperative Extension) and/or independent consultant qualified to design and implement a scientifically controlled study. A 3-5 year Study is required due to the potential for long-term health and safety, behavioral, agronomic, and mechanical conditions which may not arise or become evident in a shorter time period.

The parameters of the Study will include, at a minimum, investigations into chemical and biological effects of graywater use including testing for bacteria, chemical water quality, soil chemistry, plant tissue analysis, and maintenance requirements. Additionally, the Study will collect and tabulate data related to the quantity of water used by the graywater irrigation system as it functions to offset the use of potable water for landscape irrigation. The Study would provide, at its conclusion, a final report documenting the findings and recommendations. The primary objective of the Graywater Incentive Pilot Program and Research Study is to provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP).

The City of San Diego is requesting funding of \$400,000 to combine with its own contribution of \$400,000. Thank you for your consideration.

Larry Gardner
Water Department Director

City of San Diego, California

B. Scope of Work

Relevance and Importance

2. Statement of Critical Water Issues

A Graywater Incentive Pilot Program and Research Study will address numerous local, regional, Bay-Delta, State, and federal water issues. San Diego imports 90% of its water from Northern California and the Colorado River. The City of San Diego's diverse and extensive Water Conservation Program continues to develop and pursue programs dedicated to effectively and efficiently manage, reclaim and conserve its water resources.

Known as America's Finest City, San Diego is the sixth largest City in the United States, with a population of 1.3 million. San Diego has experienced an average annual growth rate of about 1.5% for the last nine years. Having a Mediterranean climate, coastal location, and a fairly stable economy, San Diego is considered to be one of the finest sun-belt cities in the nation.

The City covers an area of 342 square miles. Between 1990 and 1999, the City's population grew by more than 143,732 people, representing an increase of 12.9%. Population projections for the City are made every year by the San Diego Association of Governments (SANDAG). The City uses SANDAG projections for planning purposes, including estimating future water demands and wastewater treatment capacity. SANDAG's projections indicate that the City's population will increase to nearly 1.7 million by 2020. Alternative sources of water are currently being evaluated to supplement existing water supply. From recycled water for industry to water transfers, the City is studying all options for feasibility and cost effectiveness.

One option that offers a new source of local water is graywater. Graywater is untreated household wastewater which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It does not include wastewater from kitchen sinks or dishwashers. (Appendix G, Graywater Systems, Title 24, Part 5, California Administrative Code). Graywater is collected and used for irrigation using a subsurface distribution system buried nine inches below the surface.

The City of San Diego is interested in developing a pilot program to analyze the potential of using graywater irrigation in the City of San Diego. The proponents of graywater claim a potable water reduction of up to 36% and a reduction in wastewater as much as 50%.

Obviously, effective widespread use of such systems within the City of San Diego could reduce the need for future facilities for the conveyance, storage and treatment of both water and wastewater. However, prior to committing to the reduction of facilities, the City of San Diego would need critical data to determine actual water and wastewater reductions. We would also require a time increment that

the systems would need to remain operational within the City of San Diego to confirm their long term usage and benefits.

On a federal level, Secretary of the Interior Bruce Babbitt threatened to reduce Southern California's Colorado River supply unless water agencies could come up with a plan to stay within the state's 4.4 million-acre-foot apportionment. For the last five years, the state has used 5.2 million acre-feet, relying on unused and surplus river water to meet its growing demands. Graywater recycling systems may offer an answer to Secretary Babbitt's requirement for water use efficiency in California.

California rainfall and runoff vary widely throughout the State, and also vary greatly from year to year. The State's historical record of measured runoff amounts to little more than 100 years of data, but other information indicates that California has experienced climatic conditions both wetter and drier than those of the present within the past 1,000 years. Three twentieth century droughts were of particular importance from a water supply standpoint--the droughts of 1929-34, 1976-77, and 1987-92. Graywater systems have the potential for providing a local offset to drought conditions, which is of concern to the entire State of California.

The primary program objective for addressing Bay-Delta system vulnerability is to reduce the conflict between the long-term productivity of the system functions and ecosystem, water supply, and water quality functions of the system. Part of the equation for the Delta, on a State-wide level, could be the use of graywater recycling systems in communities that receive Bay-Delta water.

Locally, the San Diego City Council adopted the *Strategic Plan for Water Supply (Strategic Plan)*, on August 12, 1997, that included a water resources strategy to meet future water demands through 2015. It also identified a nine-year (Fiscal Years 1998-2006) Capital Improvements Program (CIP) to replace, upgrade and expand key water system facilities, and approved a series of rate increases to fund the initial years of the CIP. The *Strategic Plan* was the result of a year-long effort by a 30- member Public Advisory Group (PAG) that focused on the City's needs for water supply options, increased levels of water conservation, and infrastructure improvements.

The Strategic Plan also identified a mix of water supply options in order to meet the City's water demands through 2015. This mix included increasing water conservation savings by 5% over 1997 levels, enhancing the beneficial reuse of reclaimed water, and the ongoing consideration of other water supply options such as groundwater, desalination and graywater.

B. Scope of Work

Relevance and Importance

3. Nature, Scope and Objectives

The proposed Graywater Incentive Pilot Program and Research Study will initiate a long-term research study of the multiple effects of graywater irrigation systems installed by individual homeowners within the City of San Diego. Graywater is untreated household waste water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It does not include waste water from kitchen sinks or dishwashers. A financial incentive of \$1,000 will be provided for up to 300 homeowners, after they have installed a complete, County approved graywater irrigation system, to partially or fully offset the cost of their graywater irrigation system, depending on the type of system selected by participants. The dollar amount of this incentive should cover the majority, if not all, of the cost of a basic graywater system, or a portion of a highly advanced system, whichever the home-buyer selects. The steps the City will take to implement this scope include:

- § Hiring an independent research institution and/or consulting firm to design and implement the research study, and to produce a final report document.
- § Hiring a vendor to distribute financial incentives and maintain financial records of the Program.
- § Notifying the public of the existence of the Program and the availability of financial incentives.
-
- § Coordinating with the research institution and/or consulting firm conducting the study, and with the vendor distributing the rebates.

The graywater systems, with widespread installations and use, will reduce the fresh water demand and the wastewater production of local developments, thus lowering operations and maintenance costs and extending the life of existing water infrastructure and sewage treatment facilities. The graywater systems will also provide a supplemental supply of irrigation water for the developments, particularly during future droughts.

The Research Study (Study) will be conducted by an independent research institution (i.e., American Water Works Associate Research Foundation or University of California Cooperative Extension) and/or independent consultant qualified to design and implement a scientifically controlled study. A long-term Study is needed due to the potential for long-term health and safety, behavioral, agronomic, and mechanical conditions which may not arise or become evident in a shorter (one year or less) time period. Furthermore, the Study will compare and contrast the effectiveness of various approved graywater systems, from the most primitive to the most complex.

The parameters of the Study will include, at a minimum, investigations into chemical and biological effects of graywater use including testing for bacteria, chemical water quality, soil chemistry, plant tissue analysis, and maintenance requirements. Additionally the Study will collect and tabulate data related to the quantity of water used as well as total cost of the graywater irrigation system as it functions to offset the use of potable water for landscape irrigation. The Study would provide, at its conclusion, a final report documenting the findings and recommendations resulting from the Study.

A rebate of up to \$1,000 will be offered to up to 300 individual homeowners residing in the City of San Diego. Prior to receiving this rebate the homeowner will be required to present to the City's rebate vendor a signed document from the County of San Diego, Department of Environmental Health, verifying that a completed graywater irrigation system has been installed, permitted and that it meets all legal requirements.

At the time that the rebate is issued, the citizen must sign an agreement allowing the City to include their graywater irrigation system in the Study. If they are willing to participate in the Study, then the rebate vendor will supply information to them explaining that they may or may not be contacted to participate. Their selection would depend on the number, location, and type of systems selected by the researchers. The citizen would also be provided with a description of the Study, which would include the following:

- \$ Description of the goals and procedures of the Study.
- \$ Types and frequency of tests which would be performed at their property.
- \$ Types of testing and monitoring equipment which may be installed on their graywater system (e.g. water meter).
- \$ Release of liability agreement permitting limited access to their property, as required for implementation of the Study.

The proposed Program will take place over a period of 3-5 years, depending on the recommendations of the Study designed by the research institution and/or consultant. The yearly phases of the Program will proceed as follows:

- \$ Year 1 - Initiate Research Study Design and Distribute Rebates
- \$ Year 2 - Begin Study Implementation
- \$ Year 3 thru 5 - Conduct Study and publish Final Report

With a graywater system, year-round wastewater reduction is accomplished through a subsurface irrigation network placed in the landscape to irrigate shrubs, trees, flower beds, and lawns. In the soil, plants uptake the water through their roots. Plants then utilize the water through evaporation and transpiration, often called *Aevapotranspiration* in the irrigation industry.

As more graywater programs are implemented, operations and maintenance costs and the need to expand existing municipal wastewater infrastructures may be reduced or postponed, according to the amount of graywater subtracted from the total seasonal-high wastewater flow. On a large scale, these

savings would lower costs for municipalities, builder/developers, and homeowners. Reduced flows also decrease the overall use and discharge to the ocean of chemical treatments such as chlorine.

Graywater irrigation systems, installed in single family homes, can potentially offer potable water savings in the City of San Diego. This savings would be achieved by using graywater to partially offset the use of potable water for landscape irrigation. The City of San Diego has reviewed a number of graywater pilot studies conducted in various locations, and has concluded that, while these studies were informative, there is still a need to conduct a long-term (3-5 year) scientific study to investigate the health and safety, behavioral, agronomic, water savings, and cost consequences of graywater usage.

A graywater irrigation system is also a method of pollution prevention. Graywater contains suspended solids from bar bath soaps, shampoos and hair conditioners, laundry products, and the dirt and oils from the human body. Total suspended solids in graywater (TSS = approx. 90 mg/L) represent anywhere from 25-50% of the total suspended solids found in typical city wastewater streams, which ranges from 150-350 mg/L (according to San Diego Metropolitan Wastewater Department figures, including all 15 participating agencies).

With graywater systems, these solids are delivered into the soil, where they are consumed by indigenous microbes. Also, homeowners using graywater systems will often use liquid laundry detergents to avoid the high salt content of powdered detergents. These homeowners have incentive to use ecologically friendly cleaning products because their graywater will be used on their own landscape. Also, because graywater is distributed underground, it reduces irrigation runoff that causes pollutants to enter the storm water system.

Any graywater that is captured and reused for irrigation simply replaces the same amount of fresh water, thus conserving large amounts of fresh water. A typical single family home with four people will produce between 120 gallons of graywater per day (according to the San Diego County Water Authority) and 160 gallons of graywater per day (according to the California Department of Water Resources), totaling 43,800 to 58,400 gallons per year.

The objectives of the Graywater Incentive Pilot Program and Research Study are to provide information on: the documented levels of water savings, waste water flow reduction, benefits or impacts to the environment and to the safety and health of homeowners/users/neighbors, costs to the homeowner, non source-point pollution prevention and the feasibility of implementing on a much larger scale.

Most significantly, a study of 300 homes in San Diego, could provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP). The City of San Diego is requesting funding of \$400,000 to combine with its own contribution of \$400,000. Of this \$800,000 total, \$300,000 will be allocated towards financial incentives and approximately \$500,000 to the research study.

B. Scope of Work

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

4. Methods, Procedures and Facilities

Graywater is untreated household waste water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It does not include waste water from kitchen sinks or dishwashers. Studies have been performed by various entities, analyzing the value and effectiveness of graywater systems. A synopsis of sum studies follows:

EAST BAY MUNICIPAL UTILITY DISTRICT (Concluded November 1998)

Two single-family homes with 1,200 square feet of landscaping suitable for graywater were selected for this trial. There were four family members at each home and an automated graywater system was retrofitted into the existing plumbing system. A water meter was installed to measure graywater flows to the landscape .

Total Available Graywater Volume = 81.6 gallons per household per day

Graywater System Cost = \$1,250 each

Irrigation System Cost = included

Installation Cost = averaged \$4,150 at each site

Water savings over life of system = 0.09 AFY for 15 years, valued at \$895

Cost per AF saved = \$3,337/AF

Wastewater savings = not discussed

CITY OF SANTA BARBARA (1996 - 1998)

A basic gravity-fed graywater system was installed in a single-family home with one bathroom. Landscape consisted of a vegetable garden, fruit trees, and low-water using plants. The homeowners were organic gardeners who used only organic products in their landscaping, and their soil is heavily mulched and in excellent condition. The graywater system installed had no filter and no pump. The homeowners installed the system themselves, and the house was plumbed for graywater use. Graywater use during Spring and Summer months ranged from 8 to 12 HCF, while during November/December, it was 1 HCF total.

Total Available Graywater Volume = 42 gallons per household per day measured during Spring and Summer months.

Graywater System Cost = \$212

Irrigation System Cost = \$569

Installation Cost = \$350 for plumbing work, homeowners did most of installation

Water savings over life of system = 0.03 AFY for 20 years, valued at \$893

Cost per AF saved = \$397/AF

Wastewater savings = not discussed

SAN DIEGO COUNTY WATER AUTHORITY (March 1998)

The California Water Authority (CWA) completed a cost/benefit analysis on graywater including only some of the costs of the system hardware, as some of the costs were unknown at that time. CWA staff used the results of the American Water Works Research Foundation's North American Residential End Use Study to estimate the amount of graywater that would be produced by a family of three in San Diego. The findings indicated that approximately 92.7 gallons per day would be available for graywater use, to irrigate approximately 1,308 square feet of landscaped area.

Total Available Graywater Volume = 92.7 gallons per household per day

Graywater System Cost = \$3,751

Irrigation System Cost = included

Installation Cost = assumed this cost could be absorbed by construction costs

Water savings over life of system = 0.10 AFY for 10 years, valued at \$683

*Cost per AF saved = \$3,751/AF over a 10-year period **

Wastewater savings = \$792 over 10 years

*Note: MWD utilizes a 10-year amortization of water conservation devices

CHULA VISTA - SUNBOW II DEVELOPMENT (March 1999 Draft)

The Sunbow II Development is completing a Water Conservation Plan as required by the City of Chula Vista. Part of the Plan was an analysis of graywater systems.

The Plan identified potential graywater supply using estimates in Appendix G of the State Plumbing Code, and Otay Water District's Water-Efficient Landscape Irrigation Ordinance. Using a minimum assumption of four persons per household and a projected irrigation demand of 35,900 gallons per year (GPY), the Plan projected that there will be enough graywater production to supply all irrigation needs throughout the year, with a surplus of at least 22,500 GPY of graywater. The total annual cost of maintenance is estimated at \$67, and the expected life span of graywater systems is 15 years. The City of Chula Vista offers a \$555 discount on sewer connection fees.

The study recommended that graywater systems not be included in the Plan because they do not appear to be cost-effective without additional programs to reimburse the homeowner for the water/wastewater savings benefits.

Total Available Graywater Volume = 160 gallons per household per day, assuming 4 persons per household used in State Code Appendix G

Graywater System Cost = \$4,950 (\$4,395 after City of Chula Vista discount)

Irrigation System Cost = included

Installation Cost = \$400

Water savings over life of system = 0.11 AFY for 15 years, valued at \$1,200

Cost per AF saved = \$3,350/AF

Wastewater savings = none mentioned

LOS ANGELES DEPARTMENT OF WATER AND POWER (November 1992)

The Los Angeles Department of Water and Power (LADWP) studied the performance of various graywater systems for a year using eight sites. It reported water savings from all sites averaging 46%. However, the report also concluded that it is unlikely a large number of residents will install such systems, because of the maintenance requirements, complications with permitting, and costs.

Total Available Graywater Volume = 46% of total household water

*Graywater System Cost = range from \$400 (basic system with do-it-yourself installation)
to \$5,000 (fully automatic with a direct potable water connection)*

Irrigation System Cost = included

Installation Cost = included

Water savings over life of system = not mentioned in study

Cost per AF saved = not mentioned in study

Wastewater savings = not mentioned in study

Unfortunately most of these studies were limited in their size and scope, and did not compare and contrast the full range of available graywater systems. Also, the cost-effectiveness of graywater systems varied from study to study. The City's intent, by offering the financial incentive, is to lure various engineering firms, entrepreneurs and small businesses to participate in the graywater program, so that the City of San Diego can provide state-wide data on the value and effectiveness of the various systems.

Procedures for homeowners are as follows:

A rebate of up to \$1,000 will be offered to up to 300 individual homeowners residing in the City of San Diego. Prior to receiving this rebate the homeowner will be required to present to the City's rebate vendor a signed document from the County of San Diego Health Department, verifying that a completed graywater irrigation system has been installed, permitted and that it meets all legal requirements.

At the time that the rebate is issued, the citizen must sign an agreement allowing the City to include their graywater irrigation system in the Study. If they are willing to participate in the Study, then the rebate vendor will supply information to them explaining that they may or may not be contacted to participate. Their selection would depend on the number, location, and type of systems selected by the researchers. The citizen would also be provided with a description of the Study, which would include the following:

Description of the goals and procedures of the Study.

Types and frequency of tests which would be performed at their property.

Types of testing and monitoring equipment which may be installed on their graywater system (e.g. water meter).

Release of liability agreement permitting limited access to their property, as required for implementation of the Study.

The proposed Program will take place over a period of 3-5 years, depending on the recommendations of the Study designed by the research institution and/or consultant. The yearly phases of the Program will proceed as follows:

Year 1 - Initiate Research Study Design and Distribute Rebates

Year 2 - Begin Study Implementation

Year 3 thru 5 - Conduct Study and publish Final Report

Facilities will be homeowner purchased graywater systems of the size and complexity chosen by each individual homeowner. In the case of new construction homes, home buyers can choose the graywater system to install as one of the options while the house is being built.

Furthermore, the City of San Diego will issue a Request for Proposals (RFP) to hire an independent research institution and/or consulting firm to design and implement the research study, and to produce a final report document. This report will provide the scientific information required to adequately assess the value and effectiveness of graywater systems on a vast scale.

Most significantly, a study of 300 homes in San Diego, could provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP). The City of San Diego is requesting funding of \$400,000 to combine with its own contribution of \$400,000. Of this \$800,000 total, \$300,000 will be allocated towards financial incentives and approximately \$500,000 to the research study.

B. Scope of Work

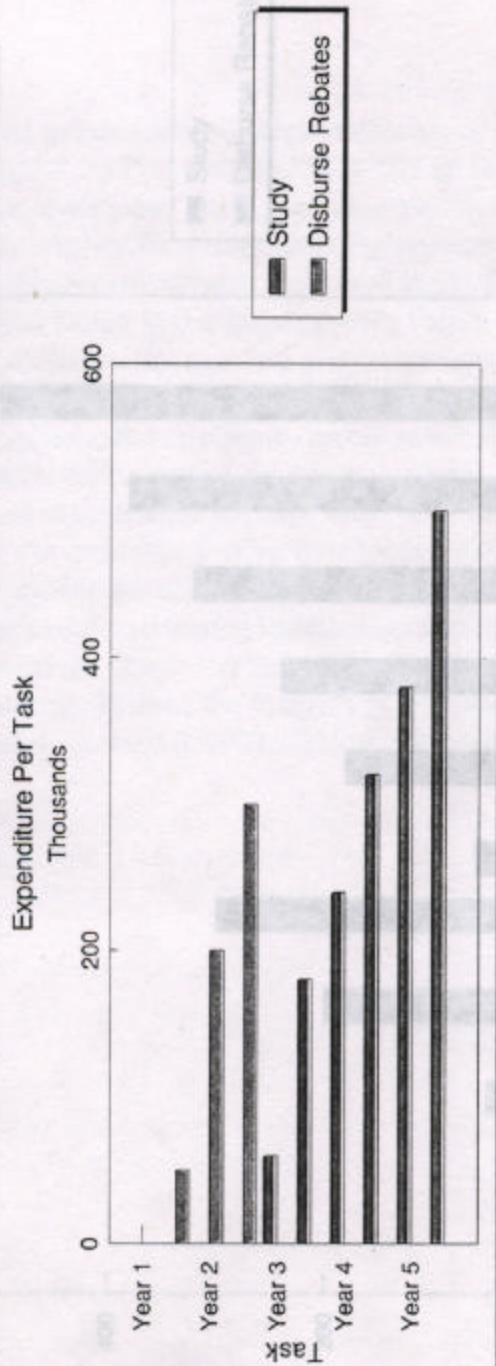
Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

5. Schedule

Attached.

GRAYWATER PILOT PROGRAM AND RESEARCH STUDY

GRAYWATER PILOT PROGRAM AND RESEARCH STUDY



B. Scope of Work

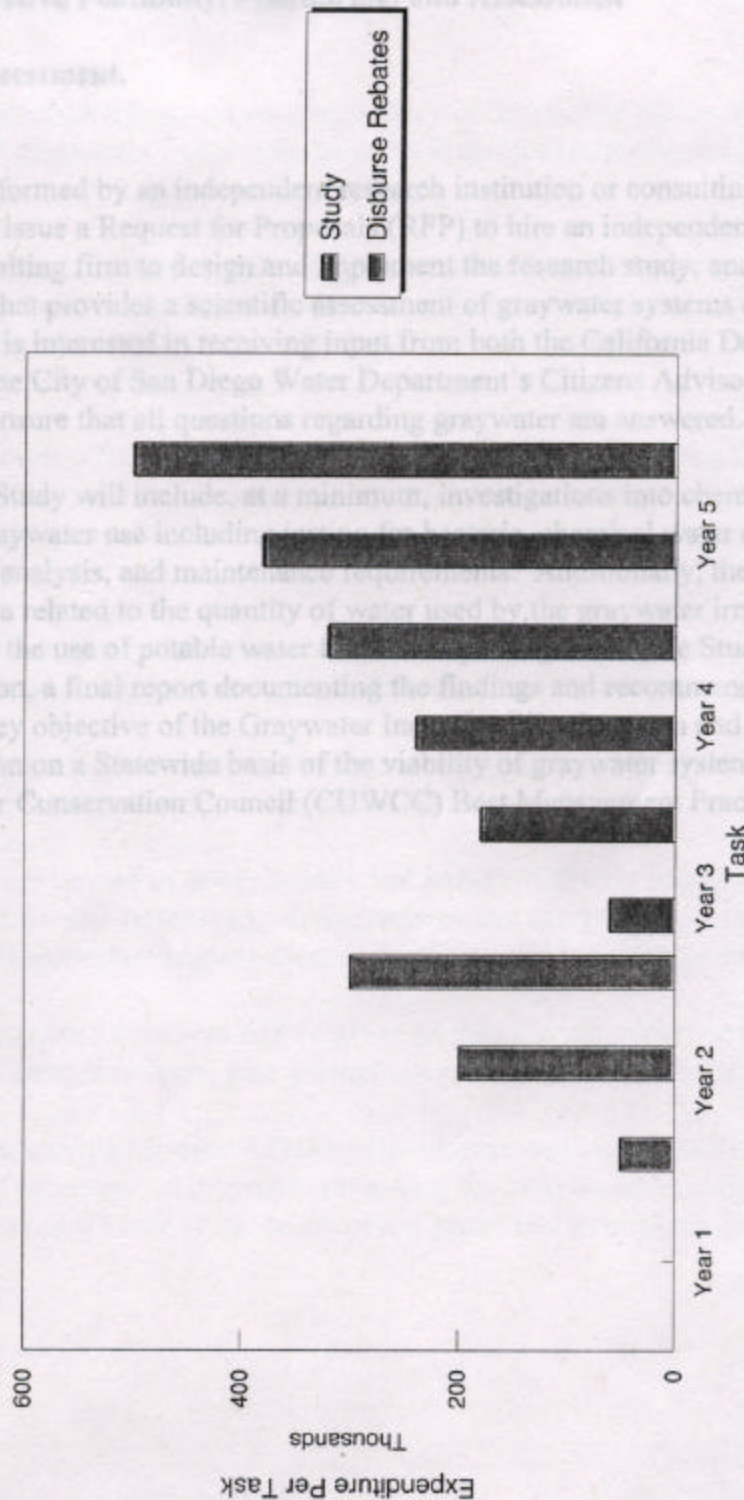
Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

6. Monitoring and Assessment

Monitoring will be performed by an independent research institution or consulting firm. The City of San Diego will issue a Request for Proposal (RFP) to hire an independent research institution and/or consulting firm to design and implement the research study, and to produce a final report documenting the study that provides a scientific assessment of graywater systems on a vast scale. The City of San Diego is interested in receiving input from both the California Department of Water Resources and the City of San Diego Water Department's Citizens Advisory Board in designing the RFP to ensure that all questions regarding graywater are answered.

The parameters of the Study will include, at a minimum, investigations into chemical and biological effects of graywater use including soil quality, soil chemistry, plant analysis, and maintenance requirements. The Study should collect and tabulate data related to the quantity of water used by the graywater irrigation system as it functions compared to the use of potable water. The Study would provide, at its completion, a final report documenting the findings and recommendations resulting from the Study. A key objective of the Graywater Irrigation Research Study is to provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP).

GRAYWATER PILOT PROGRAM AND RESEARCH STUDY



B. Scope of Work

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

6. Monitoring and Assessment.

Monitoring will be performed by an independent research institution or consulting firm. The City of San Diego will issue a Request for Proposals (RFP) to hire an independent research institution and/or consulting firm to design and implement the research study, and to produce a final report document that provides a scientific assessment of graywater systems on a vast scale. The City of San Diego is interested in receiving input from both the California Department of Water Resources and the City of San Diego Water Department=s Citizens Advisory Board in designing the RFP, to insure that all questions regarding graywater are answered.

The parameters of the Study will include, at a minimum, investigations into chemical and biological effects of graywater use including testing for bacteria, chemical water quality, soil chemistry, plant tissue analysis, and maintenance requirements. Additionally, the Study should collect and tabulate data related to the quantity of water used by the graywater irrigation system as it functions to offset the use of potable water for landscape irrigation. The Study would provide, at its conclusion, a final report documenting the findings and recommendations resulting from the Study. The key objective of the Graywater Incentive Pilot Program and Research Study is to provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP).

C. Outreach, Community Involvement, and Information Transfer

1. Describe Outreach Efforts

The project primarily involves a long-term research study of the myriad effects of an alternative irrigation system called graywater, which is installed by individual homeowners within the City of San Diego.

Since this project promotes a form of recycling, everyone should have an opportunity to have this system readily available to them. In this case, outreach efforts to contact and involve target participants including disadvantaged communities and tribal entities should be emphasized. The following steps will be implemented:

City Staff will work with Homeowners Associations, the County of San Diego, the Centre City Development Corporation, the Housing Commission, developers, and non-profit service providers--all of whom have access to disadvantaged communities and tribal entities.

Create and distribute pamphlets indicating the benefits of utilizing the graywater system within disadvantaged communities and tribal areas.

Provide a survey to disadvantaged communities and tribal entities. By doing so, these groups are given the opportunity to voice their views regarding graywater.

Participation is not limited to newly constructed homes. Existing homes can be retrofitted for graywater systems and those homeowners can participate in the Pilot Program using their current homes. Marketing efforts will include this emphasis.

Participating household members will be given an information packet on the safe use of graywater in residential settings, plus a telephone number to call for additional questions.

The Water Department's Citizens Advisory Board (representing various sections of the community) has expressed an interest in reviewing the Graywater Incentive Pilot Program and Research Study at the development phase and throughout the program.

C. Outreach, Community Involvement, and Information Transfer

2. Training, Employment and Capacity Building

There are numerous benefits that are associated with the Graywater Incentive Pilot Program and Research Study, among them are: training, employment, and capacity buildingBpotential areas where the community can be involved.

In terms of training, homeowners who agree to have this system installed on their property are essentially getting trained on how to handle and care for the system. Graywater systems depend on the knowledge and desire of homeowners to maintain the system. Control of the quality of graywater rests on the homeowner in terms of proper usage and maintenance, and of materials disposed in sinks and bathtubs. Customer education and ease of maintenance are key factors in operating safe systems.

Another benefit that is associated with graywater is the opportunity for employment. Employment is available to:

- Developers who are equipped to install the graywater system.
- Recycling companies (i.e., ReWater SystemsBa Chula Vista based graywater recycling company).
- Environmental agencies (i.e., EPA, OPRA)
- Plumbers
- Landscape contractors and laborers
- State

Additionally, by offering financial incentives, the City of San Diego encourages entrepreneurs and small businesses to compete in the design, manufacturing, and installation of graywater systems.

Moreover, the project offers benefits from capacity building. For example, the capacity of the water and sewer systems are stretched by implementing the Graywater Incentive Pilot Program and Research Study.

C. Outreach, Community Involvement, and Information Transfer

3. Disseminating Information

The results of the graywater pilot program will be released by distributing a report to the City Manager, San Diego City Council, the San Diego County Water Authority (CWA), SANDAG, the Department of Water Resources, the Metropolitan Water District of Southern California, the California Urban Water Conservation Council, the American Water Works Association, Homeowners Associations, and other agencies who are interested in the results. In addition, the results can be posted on the City of San Diego's web site, an innovative as well as interactive way to promote the Graywater Incentive Pilot Program and Research Study.

C. Outreach, Community Involvement, and Information Transfer

4. Copies of Letters to Land Use Entity, Water District and Other Cooperating Agencies

The City of San Diego is the land use entity as well as the retail water provider. A letter to the San Diego County Water Authority, requesting partnership, is attached.

February 12, 2001

Mr. Bill Jacoby
Water Resources Manager
San Diego County Water Authority
3211 Fifth Avenue
San Diego, CA 92103-5718

Dear Bill:

Subject: Partnerships for a Graywater Incentive Pilot Program and Research Study

The City of San Diego is interested in developing a Graywater Incentive Pilot Program and Research Study to analyze the potential of using graywater irrigation in the City of San Diego. The City of San Diego is applying for a Water Use Efficiency Program grant from the California Department of Water Resources. This letter serves as the City's notification to the San Diego County Water Authority that this grant is being applied for.

The proponents of graywater claim a potable water reduction of up to 36% and a reduction in wastewater as much as 50%. The proposed Graywater Incentive Pilot Program and Research Study will initiate a long-term research study of the multiple effects of graywater irrigation systems installed by individual homeowners within the City of San Diego. Graywater is untreated household waste water which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It shall not include waste water from kitchen sinks or dishwashers. (UPC Section G-2). A financial incentive of \$1,000 will be provided to up to 300 homeowners (estimated cost \$300,000), after they have installed a complete graywater irrigation system approved by the County of San Diego.

The Research Study (Study) (estimated cost \$500,000) will be conducted by an independent research institution (i.e., American Water Works Associate Research Foundation or University of California Cooperative Extension) and/or independent consultant qualified to design and implement a scientifically controlled study. A 3-5 year Study is required due to the potential for long-term health and safety, behavioral, agronomic, and mechanical conditions which may not arise or become evident in a shorter time period.

The parameters of the Study will include, at a minimum, investigations into chemical and biological

Page 2
Mr. Bill Jacoby
February 14, 2001

effects of graywater use including testing for bacteria, chemical water quality, soil chemistry, plant tissue analysis, and maintenance requirements. Additionally, the Study will collect and tabulate data related to the quantity of water used by the graywater irrigation system as it functions to offset the use of potable water for landscape irrigation. The Study would provide, at its conclusion, a final report documenting the findings and recommendations. One of the primary objectives of the Graywater Incentive Pilot Program and Research Study is to provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP).

We request an answer back as soon as possible indicating your interest in partnering. We would also be interested in any input regarding graywater issues. If you have any questions, or need additional information, I can be reached at (619) 533-4203.

Sincerely,

Chris Robbins
Supervising Management Analyst

D. Qualifications of the Applicants, Cooperator, and Establishment of Partnerships

1. Resumes of Project Managers.

Attached.

WORK HISTORY

*October 2000 Deputy Water Department Director
to Present Management Services Division, Water Department*

Administrative head with responsibility for the following department activities: water and sewer customer service, meter reading, and bill payments and processing; revenue recovery and field investigation programs; water conservation programs; water reclamation marketing; and meter and backflow maintenance and installation. Annual budget of \$17.8m with 191 total positions.

*February 2000 Program Manager, Employee Development Program
to October 2000 Competition and Organization Effectiveness Program*

Coordinate the creation and implementation of an Equal Employment Opportunity (EEO) complaint, investigation, training and resolution program. Responsible for working closely with the City Attorney's Office, Personnel, the City Manager's Office and other appropriate departments in the development of procedures which ensure that the City's existing EEO policy is implemented consistently City-wide; is accessible, understandable, and responsive to City employees at all levels of the organization; is consistent with federal equal employment opportunity guidelines and policies; and which demonstrates the City's commitment to prompt, thorough and objective complaint resolution. Coordinate and present proposed procedures to the City Manager, Deputy City Managers, department heads and other managerial stakeholders, labor organizations, and committees to gather feedback and address concerns. Work with key stakeholders to reconcile complex and sensitive competing interests. Develop EEO and complaint investigation training programs.

*February 1996 Supervising Management Analyst, Water Operations Division,
to January 2000 Water Department, City of San Diego*

Serve as assistant to the Deputy Director as well as oversee Division productivity and efficiency improvement efforts and other special assignments. As head of the Administrative Support unit, have directly supervised a 10 member staff of professional, para-professional and clerical subordinates. Independently represent the Division and Deputy Director at meetings with the City Manager, other City Departments, the Civil Service Commission, Competition Advisory Panels, State Employment Development Department, and consumer groups and industry representatives. Completed a variety of special projects, including a competitive assessment analysis; Department Employee Attitudinal Survey; Department Communications Program; and Water Department new-hire academy. Oversee the development of Division performance measurement standards. Supervise Division information systems operations, including hardware and software acquisition and budgetary accounting. Supervised the Division motive equipment

program including acquisition, expenditure tracking, inter-departmental SLA development, preventive maintenance program, etc. Manage efficiency optimization review performed by contract consultant. Coordinate four-year historical expenditure and fully allocated cost analysis of distribution system operations. Oversee comparative benchmark analysis of distribution operations vis-a-vis other public and private water utilities. Coordinate with and assist the Labor Relations Office during the Meet and Confer and meet and discuss processes. Administer the Division Light Duty and Injured Worker Program. Review and administer employee reward programs, including the Employee of the Quarter, Perfect Attendance, and Discretionary Leave Bucks programs. Conduct fact finding investigations of employee discrimination, sexual harassment, employee misconduct, and work place threats. Review and approve, as authorized designee, a variety of operational documents, such as advanced notices of termination and other disciplinary actions, certification request, payroll time sheets, payroll change notices, overtime requests, performance reviews. Coordinate alternative employment outreach efforts, such as the use of citizen volunteers, San Diego Consortium's Hire-a-Youth program, management and engineering interns, and ARC San Diego referrals.

1994 to 1996 *Senior Personnel Analyst, Outstation Program,
Personnel Department, City of San Diego*

Assigned to the Water Distribution, Wastewater Collection, Engineering and Services Divisions of the Water Department; Operations and Maintenance Division of the Metropolitan Wastewater Department. Provided on-site human resource expertise. Trained employees in Equal Employment policy. Coordinated appointing authority interview processes. Provided technical expertise in division reorganization efforts, disciplinary problems and other policy and procedural issues.

1991 to 1994 *Senior Personnel Analyst, Recruiting/Equal Employment Investigations,
Personnel Department, City of San Diego*

Managed recruitment for the more difficult/sensitive classifications. Investigated allegations of discrimination and harassment in the workplace. City-wide trainer for appointing authority interview and sexual harassment training.

1988 to 1991 *Personnel Analyst, Classification, Personnel Department, City
of San Diego*

Classification and compensation analysis. Evaluated requests from employee organizations, City management and employees regarding the establishment of new classes. Two years experience on the City Management Team for meet and confer negotiations with employee groups. Staff to the Salary Setting Commission responsible for determining the salary of the Mayor and City Council.

Luis S. Generoso

Objective

To acquire a challenging and progressive position in administrative, research, or organizational management in a dynamic organization that will maximize my analytical and management skills, and support career growth.

Professional Highlights

Program Management

- Extensive experience designing and implementing water conservation programs for the City of San Diego based on current and potential Best Management Practices; drafting, negotiating and monitoring adherence to scope of work by consultants; drafting agreements and memoranda of understanding with customers, other departments and water agencies; participating in consultant selection process; reviewing consultant reports; and initiating quality control checks; managing the Water Reclamation Marketing and Customer Retrofit Program, ensuring compliance to EPA beneficial reuse requirements; managing the development of the Water for Industry Program which looks into using reclaimed water for industrial processes.
- Extensive experience in designing consumer research methodologies for local, regional and national projects for a major multinational manufacturing company; evaluating product development and marketing plans, and recommending marketing research strategies.
- Varied experience in running the City of San Diego's Water Conservation Program since November of 1996, including budget preparation and fiscal monitoring responsibilities; measuring performance; and developing standards.

Personnel Management and Leadership

- As the Water Resources Program Manager - developed and implemented a plan to combine two existing sections, and eliminate 14 overbudget positions; hired and trained highly specialized staff (landscape architect, public information officer, program managers, engineers) to support all programs.
- As the Water Conservation Program Manager - responsible for hiring, training, evaluating performance, and managing the workload of 19 full-time professional, field, and office employees of the City of San Diego's Water Conservation Program; experience in preparing position classification studies, interviewing and selecting applicants, recognizing exceptional performance and practicing progressive discipline to improve performance.
- As President of the City of San Diego Filipino-American Employees' Association - championed the case for revising the existing promotional process and employee performance evaluation system with the City Personnel Department and Civil Service Commission, and help develop a pilot program for an enhanced promotional process.

Public Administration

- Highly familiar with and possess practical experience in a wide variety of City processes such as drafting and routing Requests for Council Action and Manager's Action; section budget preparation; serving as the primary City liaison for the City Manager's Water Conservation Advisory Committee and the Water for Industry Advisory Committee; drafting BMP compliance reports, Manager's Reports and reference documents on status of program activities, water savings and justifications for continued funding of water conservation programs; analyzing program cost effectiveness; and projecting the effects of demand management efforts on future water supply.
- Experience in developing department policies and procedures in administering a Municipal Code Section; interpreting Federal, State, and local policies and

regulations; representing the City in meetings with other cities, utilities, and other government offices.

Communication and Customer Service

- Extensive experience orally presenting research findings to corporate management; drafting executive summaries and final reports; preparing State mandated reports, Manager's Reports, department press releases and newsletter articles; coordinating information dissemination to the public and media during water main breaks and other service interruptions; making oral presentations to the City Council, Civil Service Commission, professional, scientific and civic groups, including several international delegations, as a member of the Speakers Bureau; and representing the City in forums on controversial and highly criticized topics.
- Initiated focus group discussions and customer feedback surveys to determine customer preferences in developing/sustaining water conservation programs.

Experience

Dec. 1997 - Present City of San Diego Water Department

Water Resources Program Manager

Responsible for the development and implementation of water conservation and water reclamation marketing programs; created a combined section to maximize efficiency and reduce costs as part of the Department restructuring efforts; responsible for the development of Water for Industry program which evaluated treated reclaimed water for industrial processes. The position was reclassified into an option title off the Recycling Program Manager classification in May 1999.

Nov. 1996 - Dec. 1997 City of San Diego Water Department

Water Conservation Program Manager (Supervising Management Analyst)

Responsible for the continued implementation of water conservation programs, with an annual budget of \$3 million. Participated in the City's Strategic Plan for Water Supply, identifying new potential for an additional 5% water conservation.

July 1991 - Nov. 1996 City of San Diego Water Department

Water Conservation Analyst

Administered water conservation programs for the City of San Diego, including residential and non-residential retrofit and low-income programs, ordinance administration, school program, and public information campaigns.

July 1983 - Mar. 1987 Unilever, Ltd. Manila, Philippines

Marketing Research Analyst/Assistant Operations Manager

Perform statistical analyses of market research studies. Specialized in obtaining customer feedback to enhance products and services offered. Was promoted to Assistant Operations Manager after three years of work as a Research Analyst. (Unilever is the international corporate name of Lever Brothers, NY, which is a leading manufacturer of popular consumer products.)

Education

1979 - 1983 Ateneo de Manila University Manila, Philippines

Bachelor of Science Degree in Management Engineering.

Recipient, William Jones, S.J., Academic Scholarship (1979 - 1983).

Training and Other Activities

Completed the following training classes: Supervisor's Academy 2000; Budget Process; Interactive Management; Conservation Program Design and Evaluation; Commercial Water Conservation; and other relevant computer application courses.

References

References will be furnished upon request.

D. Qualifications of the Applicants, Cooperator, and Establishment of Partnerships

2. Role of External Cooperators.

External Cooperators include:

Developers

Although houses may be retrofitted to use graywater systems, some graywater systems require that the home be initially plumbed with separate systems for graywater and blackwater. There are additional costs to developers to design and build separate plumbing systems. Developers must be recruited by the City to build homes with separate plumbing systems.

Participation is not limited to newly constructed homes. Existing homes can be retrofitted for graywater systems and those homeowners can participate in the Pilot Program using their current homes. Marketing efforts will include this emphasis.

Homeowners and Families

Homeowners and home buyers must express a desire to purchase a graywater system. The long term value and benefits of a sub-surface graywater system must be assessed by each individual. Individuals may have concerns over the value added to their property for installing such systems. The Graywater Incentive Pilot Program and Research Study (Study) will offer an incentive of \$1,000 towards the purchase of any graywater system the specific homeowner desires. These systems can vary from simplistic designs to extremely advanced systems. Prior to receiving this \$1,000 rebate the homeowner will be required to present a signed document from the County of San Diego, Department of Environmental Health, verifying that a completed graywater irrigation system has been installed and that it meets all legal requirements. At the time that the rebate is issued to the citizen they will be asked to sign an agreement allowing the City to potentially include their graywater irrigation system in the Study. If they were willing to participate in the Study and Rebate Program then the City would supply information to them explaining that they may or may not be contacted to participate. Their selection would depend on the number, location, and type of systems selected by the researchers. The citizen would also be provided with a description of the Study, which would include the following:

- Description of the goals and procedures of the Study.

- Types and frequency of tests which would be performed at their property.

- Types of testing and monitoring equipment which may be installed on their graywater system (e.g. water meter).

- Release of liability agreement permitting limited access to their property, as required for implementation of the Study.

Monitoring will be performed by an independent research institution or consulting firm.

County of San Diego, Department of Environmental Health

The County of San Diego, Department of Environmental Health (DEH) is responsible for the monitoring of waste water (graywater is a type of waste water) discharge and soil suitability for graywater systems. DEH will be tasked with permitting graywater systems.

San Diego County Water Authority

The San Diego County Water Authority (CWA) may be recruited as a participant in this program. CWA was proposing its own Graywater Incentive Pilot Program that will evaluate graywater recycling and collect data relevant to San Diego. In this program, a \$260 incentive will be provided for the installation of graywater systems.

External Consultants

The City of San Diego will issue a Request for Proposals (RFP) to hire an independent research institution and/or consulting firm to design and implement the research study, and to produce a final report document that provides a scientific assessment of graywater systems on a vast scale. The City of San Diego is interested in receiving input from the Department of Water Resources in designing the RFP, to insure that all questions regarding graywater are answered.

The City may also contract out the financial incentive (\$1,000 rebate) to a private company that performs a rebate processing and check printing service.

Private Industry

Additionally, by offering financial incentives, the City of San Diego encourages entrepreneurs and small businesses to compete in the design, manufacturing, and installation of graywater systems.

D. Qualifications of the Applicants, Cooperator, and Establishment of Partnerships

3. Partnerships.

One of the key objectives of the Graywater Incentive Pilot Program and Research Study is to provide information on a Statewide basis of the viability of graywater systems as a California Urban Water Conservation Council (CUWCC) Best Management Practice (BMP). Therefore, it behooves the City of San Diego to form partnerships with other agencies to answer all concerns about graywater recycling and effectiveness. The City of San Diego will seek input from: the County Water Authority, other local water service providers (Conservation Coordinators), the Metropolitan Water District of Southern California, the U. S. Bureau of Reclamation, the Department of Water Resources, the California Urban Water Conservation Council, and the American Water Works Association to determine what information should be collected as part of this Study.

E. Costs and Benefits

1. Budget Summary.

Title	Direct	Indirect	City Share	Grant Share
Salaries	\$26,872.80		\$26,872.80	\$0
Fringe	\$7,424.83		\$7,424.83	\$0
Supplies				
Equipment				
Consultants	\$500,000.00		\$250,000.00	\$250,000.00
Travel				
Other (Rebate)	\$300,000.00		\$150,000.00	\$150,000.00
Total Estimate	\$834,297.63		\$434,297.63	\$400,000.00

2. Budget Justification.

Salaries and fringe are for 0.50 Full-Time Equivalent (FTE) of the City's Associate Management Analyst job classification to manage this Program. This cost will be borne by the City, only if this Grant application is approved. Consultant costs are anticipated to be \$500,000 for a five year study, based on verbal estimates. Once the City issues a Request for Proposals for this Program and associate Study, these estimated figures can be updated. Costs for rebates would be to a maximum 300 homes at \$1,000 each.

3. Benefit Summary and Breakdown.

California graywater regulations estimate that there exists the potential to capture 40 gallons of graywater per person per day from a single family residence (Title 24 of the California Administrative Code). The potential graywater volume per household in San Diego is lower than the State average. This was demonstrated when the City of San Diego participated in the American Water Works Association Research Foundation (AWWARF) North American Residential Water End Use Study conducted in 1996 and 1997. This study monitored the water uses of randomly selected single-family homes and identified how water was used. The study listed 2.9 persons per household. Based on the study, total indoor water use was measured at 132 gallons per household, of which 92.7 gallons came potentially from acceptable graywater sources. This lower volume reflects the water conserving habits that San Diegans have adopted compared to the rest of California. This is lower than the State Code

estimate of 120 gallons. The fact that the City enforces the use of water-conserving devices in new construction supports this dynamic.

For a household of three persons, the potential graywater volume is 92.7 gallons per day. However, the potential graywater volume does not necessarily equate to potable water savings. Potable water savings is defined as the amount of graywater used to meet landscape water needs previously irrigated by potable water. Although more graywater can be applied to the landscape than what is needed, water saved includes only the amount of potable water replaced by graywater.

Previous studies have identified an irrigation demand for a 1,200 sq. ft. landscape. It is the average size of landscape planned for some new homes. The City's analysis assumes the average area that would be irrigated with graywater is also 1,200 sq. ft. This size accounts for what is available in new homes and that irrigating 1,200 sq. ft. of landscape with graywater optimizes its usage and minimizes the amount of potable water supplement. Based on the ebb and flow of the seasons, potable water savings using San Diego AWWARF data amounts to an estimated 28,483 gallons per year per system. For 300 systems, this could equate to 8.5 million gallons of water saved per year.

Should graywater systems prove to be effective, saving 8.5 million gallons per year of water should provide benefits to all the aforementioned project partners identified under Section D-3. By not needing to pump and extract 8.5 million gallons of water each year from the Bay-Delta, graywater can assist with issues of infrastructure for water supply conveyance, water quality, and aquatic and terrestrial habitat protection. The proposed Graywater Incentive Pilot Program and Research Study will provide information on: the documented levels of water savings, waste water flow reduction, the benefits or impacts to the environment and to the safety and health of homeowners/users/neighbors, costs to the homeowner, non source-point pollution prevention and the feasibility of implementing on a much larger scale.

4. Assessment of Costs and Benefits.

The City of San Diego is specifically trying to avoid making assumptions about graywater systems. The studies available are often on performed on a small scale, and don't adequately research the effectiveness of graywater across the socio-economic spectrum. The City does make the assumption that a financial incentive of \$1,000 towards the installation of a system will generate sufficient interest to perform the aforementioned Study.

Because of the varied available information related to graywater systems, expressing their overall benefits, at this juncture, is an impossible task. Only through a controlled and independently administered research study, can an assessment take place. The City of San Diego wishes to take the lead in compiling just such a report, that assesses the full costs and benefits of graywater systems, on a large scale.